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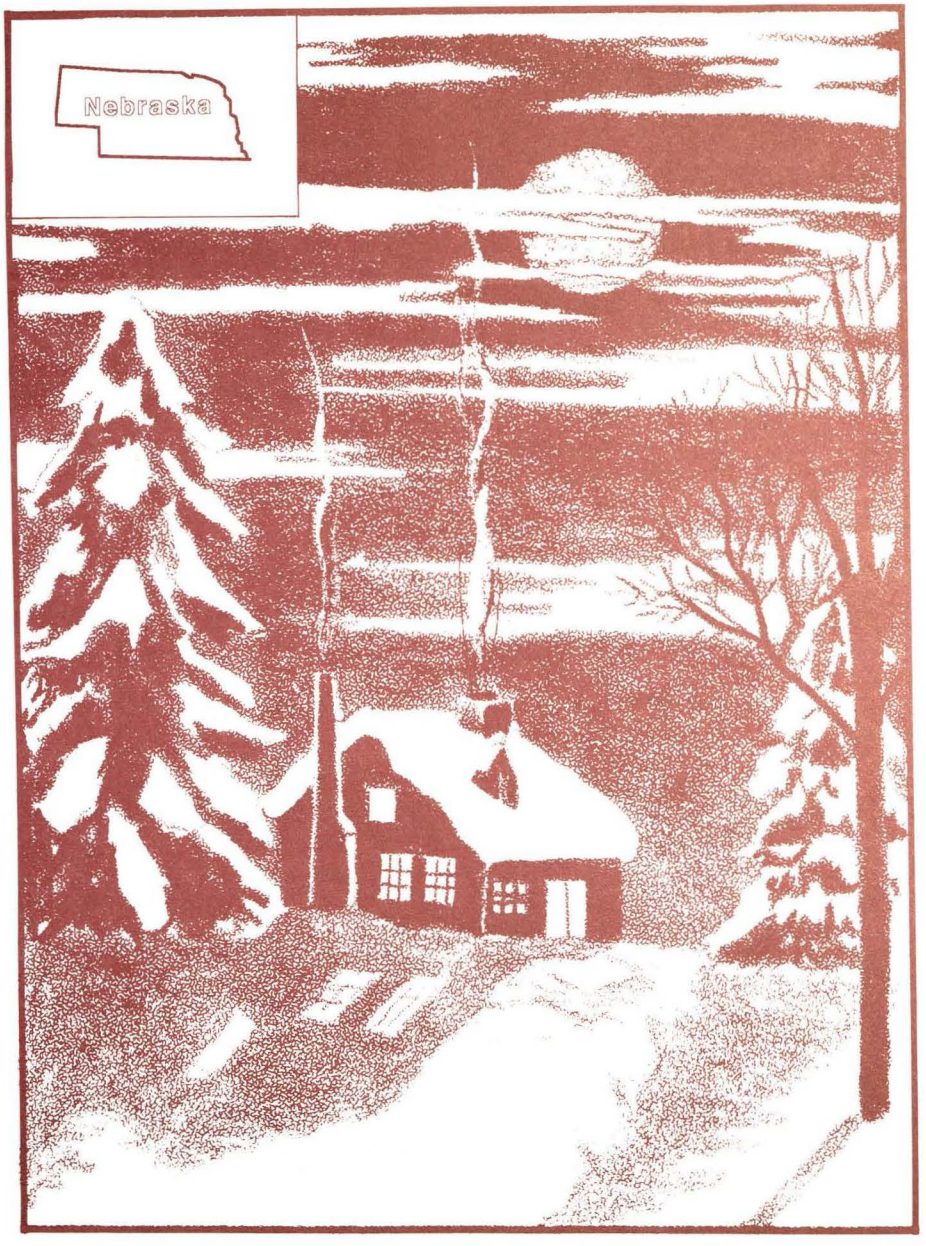
Residential Fuelwood Consumption and Production in Nebraska, 1994

Dennis M. May



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FOREWORD

This bulletin reports the results of a survey of residential fuelwood consumption and production in Nebraska for a 1-year period encompassing the 1993/1994 heating season. Topics examined include the geographic distribution of residential fuelwood consumption and production within the State; the species of trees used for residential fuelwood; the types of wood-burning facilities used; the reasons for burning fuelwood; and the land, ownership, and tree classes from which fuelwood was produced. Such detailed information is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, forest industry development, and forest research.

Special thanks are given to the Nebraska households and commercial producers who supplied information for this study. Their cooperation is greatly appreciated.

The Kansas State University Department of Horticulture, Forestry and Recreation Resources is acknowledged for its cooperation in conducting the survey, and special thanks are offered to the faculty, staff, and students involved for their diligence in phoning and questioning the survey respondents.

In this bulletin, consumption refers to the volume of fuelwood burned by Nebraska's households, regardless of the source of the fuelwood (roundwood, wood residues from primary or secondary manufacturing, scrap or waste wood products, etc.). Production refers only to the volume of roundwood harvested to supply Nebraska's wood-burning households. This report *does not* include information about harvesting for industrial fuelwood. Such information is included in reports covering wood use by primary processing plants.

Row and column data of tables may not sum due to rounding, but data in each table cell are accurately displayed.

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CONSUMPTION

- One in three Nebraska households had facilities to burn wood in 1994, but only two-thirds of them actually burned wood in that year (table 1).
- As a result, only one in five households burned wood in 1994, but a higher proportion was expected to burn wood in 1995.
- In 1994, more than 10,000 households planned to install wood-burning facilities. About two-thirds of the installations will be new; the rest will be replacement or supplemental units for households already engaged in wood burning.
- Most of the increased possession and use of wood-burning facilities was expected to occur in the Eastern Unit of the State (table 1 and fig. 1).
- On average, each of Nebraska's wood-burning households burned 1.2 cords of fuelwood in 1994, for a total consumption of just over 150 thousand cords (table 2).
- Pleasure was the most popular reason for burning fuelwood in 1994.
- On average, households that burned wood for pleasure consumed about half a cord of fuelwood, only a fraction of the volume consumed by households that heated with wood.

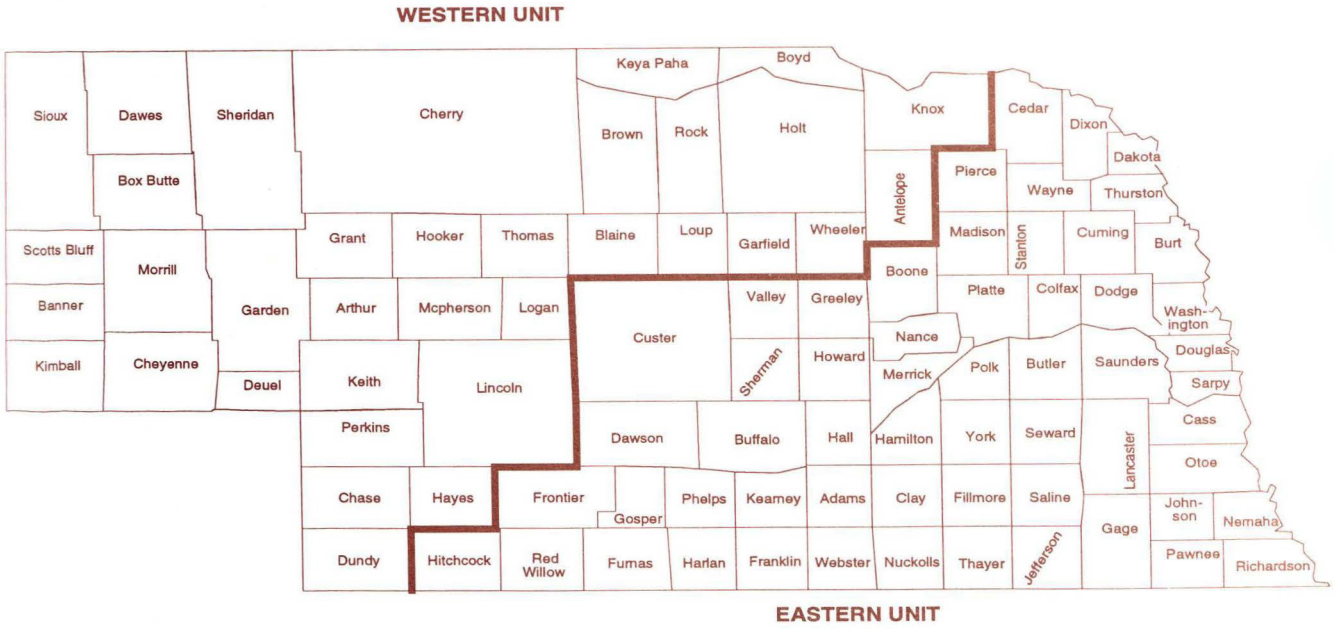

Figure 1.—*Forest Survey Units in Nebraska.*

Dennis M. May, Research Forester, received a B.S. degree in forest management from the University of Maine and an M.S. degree in forest resources from the University of Idaho. He joined the USDA Forest Service in December 1983, and has been working with the North Central Station's Forest Inventory and Analysis Unit since May 1992.

- As a result, more fuelwood was consumed for home-heating purposes than for pleasure in 1994 (table 2 and fig. 2).
- Fireplaces were the most popular type of wood-burning facility used by Nebraska households in 1994 (table 3).
- Two-thirds of households that burned wood in fireplaces did so for recreational purposes, while 90 percent of households that burned wood in wood stoves did so for home-heating purposes (table 4).
- As a result, more fuelwood was burned in wood stoves in 1994 than in the more numerous fireplaces (fig. 3).
- In 1994, the majority of Nebraska's wood burners were veteran wood burners who had burned wood for at least 5 years (table 5).
- These veteran wood burners were more likely to burn wood for home-heating purposes (fig. 4), and consequently burned two-thirds of all fuelwood consumed in 1994.

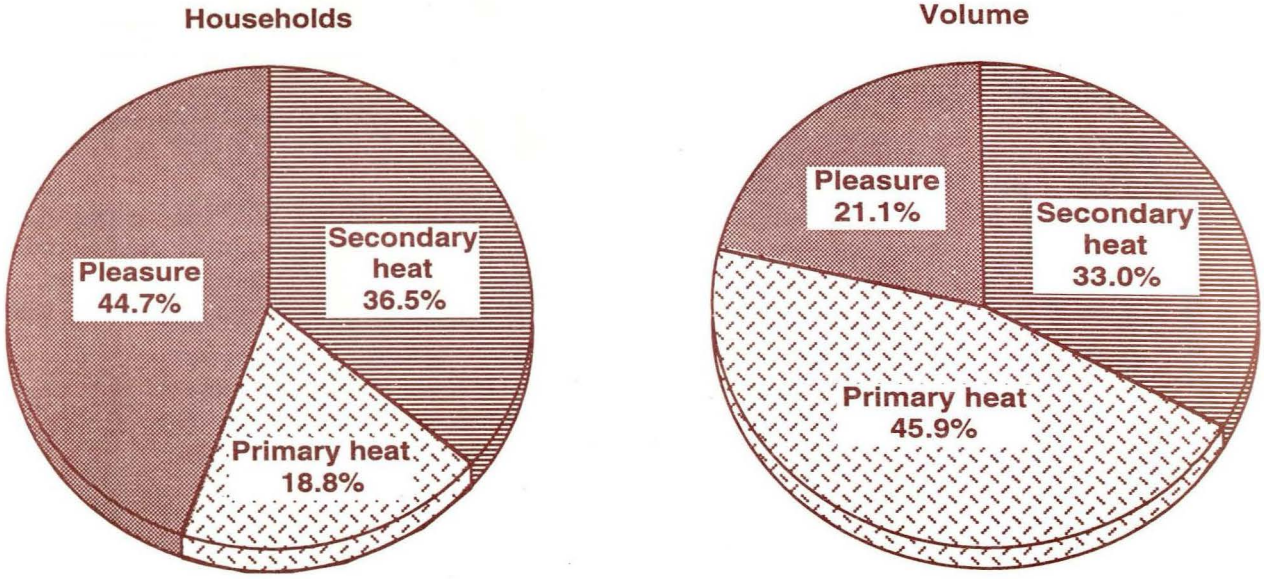

Figure 2.—*Distribution of residential fuelwood consumption by reason for burning, Nebraska, 1994.*

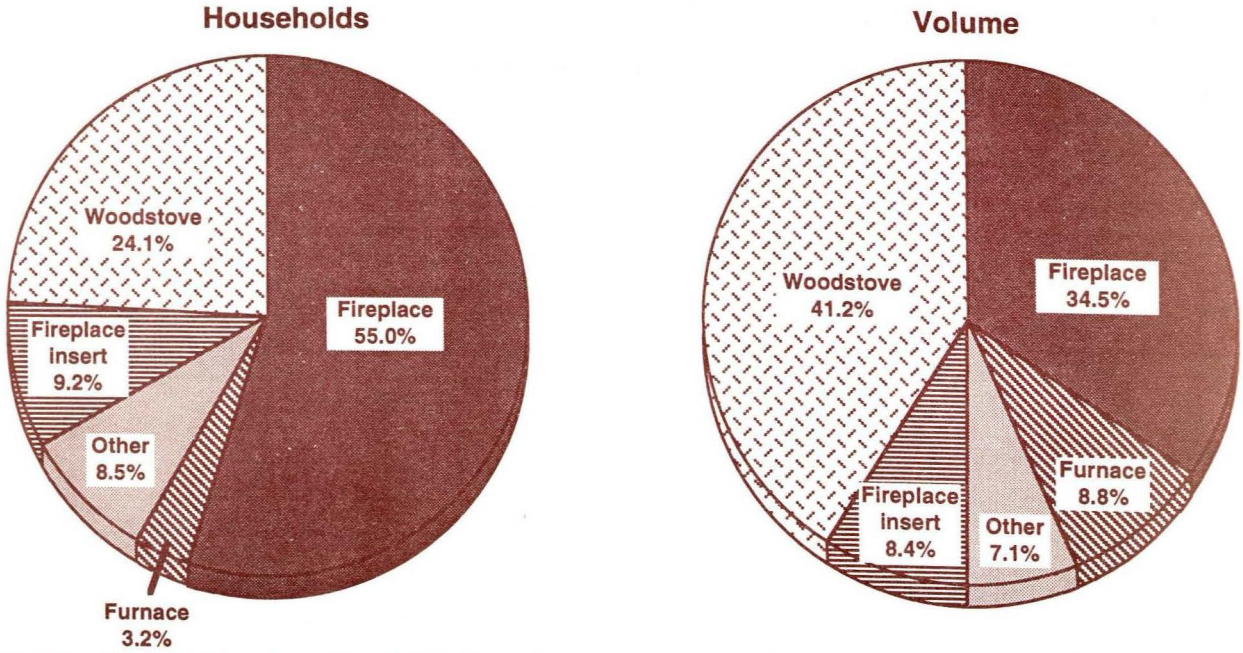

Figure 3.—*Distribution of residential fuelwood consumption by wood-burning facility, Nebraska, 1994.*

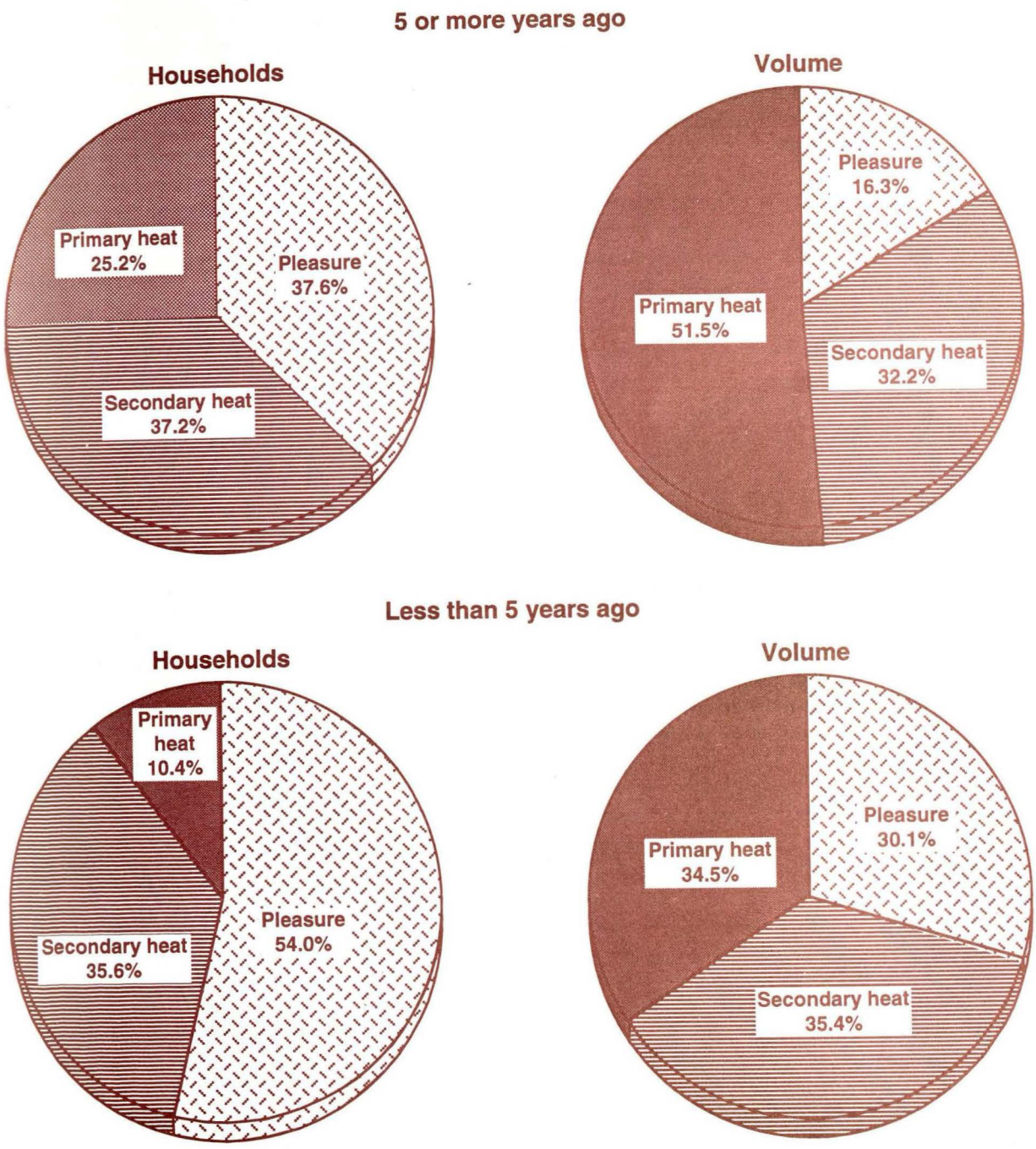

Figure 4.—*Distribution of residential fuelwood consumption by reason for burning and year first burned wood, Nebraska, 1994.*

- Almost all of the fuelwood burned in 1994 was consumed at primary residences (table 6).
- Almost all of the fuelwood burned came from roundwood, but about 4 percent of the households relied on wood residues for all or part of their fuelwood needs in 1994 (table 7).
- Three main species—cottonwood, ash, and elm—accounted for more than 70 percent of the volume burned. Oak, an important species in the Eastern Unit, accounted for another 12 percent of total consumption (table 8).

- Two-thirds of Nebraska's wood-burning households cut all or part of the fuelwood they burned in 1994 (table 9).

- A higher proportion of households in the Western Unit cut their own fuelwood than did in the Eastern Unit.

- In total, 70 percent of the volume burned in 1994 was cut by residents of wood-burning households. Most of the remaining volume, one-fifth of the total consumption, was purchased (fig. 5).

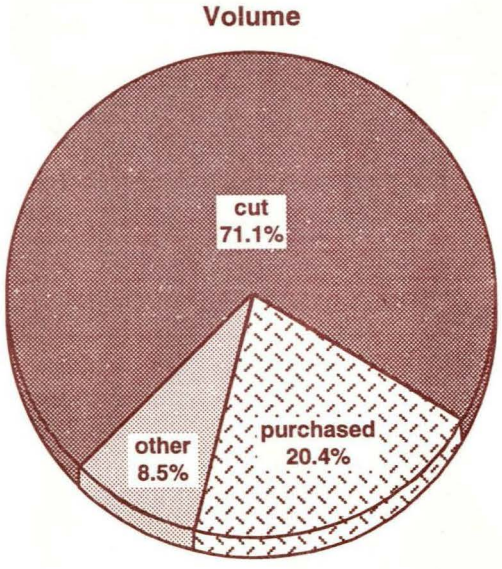

Figure 5.—*Distribution of residential fuelwood consumption by method of procurement, Nebraska, 1994.*

- Purchased wood was most frequently delivered in cords of stove-length wood, commonly referred to as face cords or ricks (table 10). Sixteen-inch wood was most common, but 24-inch wood was also popular.

- On average, households that purchased fuelwood burned about three-quarters of a cord of purchased wood each in 1994.

PRODUCTION

- In 1994, 174 thousand cords of roundwood fuelwood were cut in Nebraska to meet the State's current and future residential fuelwood demands (table 11).

- One-third of this volume was produced from forest land sources, mostly dead trees. The remainder was cut from a variety of nonforest land sources (fig. 6).

- Four species—elm, cottonwood, ash, and oak—accounted for 86 percent of the fuelwood cut (table 12), but oak was prevalent only in the Eastern Unit (table 13).

- Private lands supplied most (93 percent) of the fuelwood harvested (tables 14, 15).

- In 1994, little more than 1 percent of all fuelwood produced was cut from growing-stock portions of live timberland trees (tables 16, 17 and fig. 7). As a consequence, fuelwood removals had very little impact on the growing-stock inventory of Nebraska, the traditional supply source of the State's primary wood-using industry.

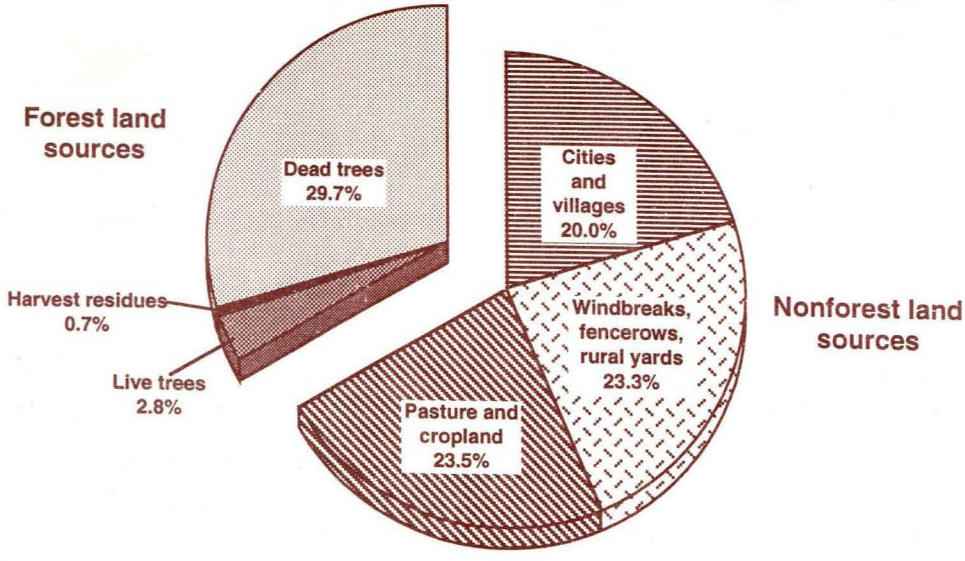

Figure 6.—*Distribution of residential fuelwood production by source of material, Nebraska, 1994.*

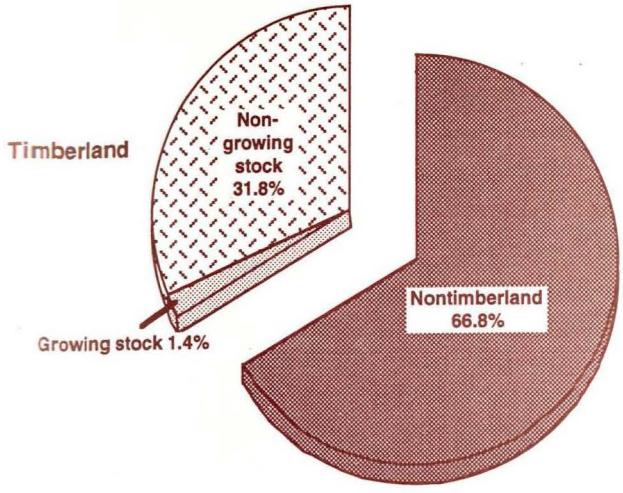

Figure 7.—*Distribution of timber removals associated with residential fuelwood production, Nebraska, 1994.*

APPENDIX

STUDY METHODS

Data for this publication were collected by a telephone survey conducted during September 1994 by the Department of Horticulture, Forestry and Recreation Resources at Kansas State University. The telephone survey sampled Nebraska households and canvassed all known commercial producers, using formal questionnaires prepared by the North Central Forest Experiment Station and approved by the Federal Office of Management and Budget.

Households

The sampled universe encompassed all households in Nebraska with telephones. A total sample size of 900 households was selected based on funding available and a desired standard error of less than ± 20 percent statewide at one standard deviation. The State was stratified into two sampling strata (urban and rural) based on population densities within counties (fig. 8).

The total number of samples was disproportionally allocated to each stratum based on the number of households and the expected variation in fuelwood production in each stratum. The strata samples were proportionally distributed across the counties in each stratum based on the number of households in each county. The county samples were evenly distributed across the three-digit telephone exchanges in each county. A random list of telephone numbers was generated for each county using all listed three-digit phone exchanges. One call was placed (whether successful or unsuccessful) to each of the random telephone numbers until the necessary number of residential households within each exchange and county was contacted. In the urban stratum about 1 in 1,235 households were sampled; in the rural stratum about 1 in 477 households were sampled. Stratum sample responses were expanded to population estimates of total fuelwood use based on these sample rates.

Commercial Producers

A list of commercial fuelwood producers was compiled from advertisements for firewood sales discovered in a one time search of all Nebraska newspapers and telephone directory yellow pages. A total of 48 commercial producers were found. All of these commercial producers were canvassed about their production of residential fuelwood, using a formal questionnaire similar to that used for households. Possible duplicate sampling of commercial producers was minimized by cross checking telephone numbers of all sample households producing more than 20 cords of fuelwood against the commercial producers list.

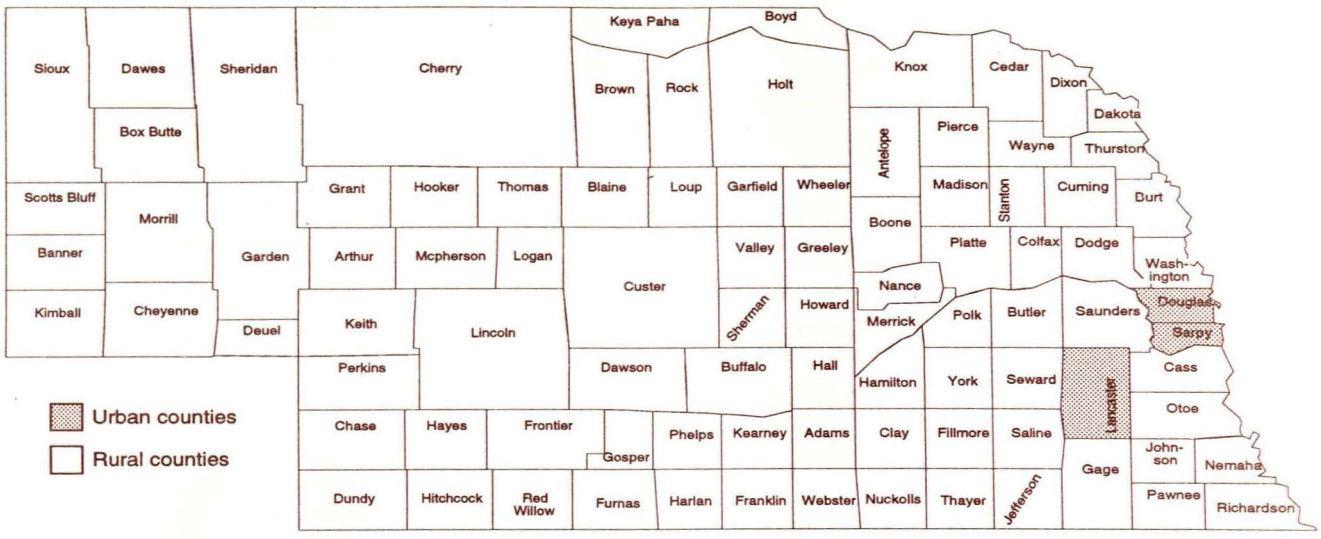

Figure 8.—*Sampling strata in Nebraska.*

Completed questionnaires were sent to the North Central Forest Experiment Station for editing and processing. Some respondents did not know the tree species cut or burned for fuel, except in general terms such as mixed hardwoods. As part of the processing, general species groupings were prorated to individual species specifically identified as being harvested or burned in a sampling stratum and Forest Survey Unit.

SAMPLING ERROR

All the reported figures are estimates based on sampling procedures that are designed to give accurate estimates of residential fuelwood consumption and production. A measure of reliability of these figures is given by sampling errors. This sampling error means that the chances are two out of three that the results for the sample differ by no more than the amount indicated from the results that would have been obtained if a complete census of all households and commercial producers had been made. Sampling errors for estimates of residential fuelwood consumption and production in Nebraska are shown at the bottom of this page.

STUDY LIMITATIONS

This study reports both the consumption and production of residential fuelwood in Nebraska for a 1-year period ending at the time of the telephone survey, essentially encompassing the 1993/1994 burning season, but dated 1994 for reporting purposes. Consumption refers to the volume of fuelwood burned by Nebraska's wood-burning households, regardless of the source of the fuelwood (roundwood, wood residues from primary or secondary manufacturing, scrap or waste wood products, etc.). Production, on the other hand, refers only to the volume of roundwood harvested to supply Nebraska's wood-burning households. Due to these definition

Stratum	Consumption (Cords)	Error (Percent)	Production (Cords)	Error (Percent)
Urban residential	44,845	19.7	60,788	24.2
Rural residential	105,766	12.5	112,298	13.0
Residential households	150,611	10.6	173,086	12.0
Commercial producers	—	—	750	—
State total	150,611	10.6	173,837	11.9

differences, as well as seasoning time, leftover fuelwood inventories from previous years, gift or free wood, cross-State wood movement, fluctuating participation in wood burning, use of wood residues and wood wastes, estimates of fuelwood production and consumption should not be expected to match in a given year.

Additionally, production does not include fuelwood produced from wood residues generated at primary wood-using mills (such as sawmills and cooperage mills), fuelwood produced from roundwood for industrial consumption, fuelwood produced from wood residues generated at secondary wood-using mills (such as millwork plants and furniture plants), or fuelwood produced from waste wood products. However, fuelwood produced from primary mill residues and fuelwood produced for industrial consumption are captured in other studies. And although fuelwood production from secondary mill residues and waste secondary wood products is beyond the scope of Forest Inventory and Analysis duties, part of this volume is captured in the consumption portion of the residential fuelwood studies.

Households without telephones were not sampled. To compensate for this omission, sample responses from households with phones were assumed representative of the relatively small number of households without phones, and were expanded across all existing households in Nebraska. Study results may be slightly biased if fuelwood consumption or production per household differs significantly in quantity or sources between phoneless households and households with phones.

Some commercial producers may not advertise in newspapers or the yellow pages, or may not have been advertising when the commercial producers list was compiled. Consequently, some commercial producers may have been excluded from the study, which would result in a conservative estimate of fuelwood production.

To assess the impacts of fuelwood harvesting on the State's forest inventory from telephone survey responses, reported fuelwood harvests from "woodland areas outside of city or village limits" were assumed to be the same as forest land harvests, and all forest land harvests were assumed to be timberland harvests.

DEFINITION OF TERMS

Central stem.—The portion of a tree between a 1-foot stump and the minimum 4.0-inch top diameter outside bark or the point where the central stem breaks into limbs.

Commercial producers.—Commercial fuelwood operators. Those who harvest fuelwood to sell to dealers or consumers. Includes loggers who harvest fuelwood along with saw logs and other products.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam, Osage-orange, and redbud.)

Cord (standard fuelwood).—A pile of logs 4x4x8 feet (128 cubic feet including air space and bark). A standard cord of fuelwood contains 70 cubic feet of wood and 58 cubic feet of bark and air space.

Cull removals.—Net volume of rough and rotten trees, plus the net volume in sections of the central stem of growing-stock trees that do not meet regional merchantability standards, harvested for roundwood products.

Dead removals.—Net volume of dead trees harvested for roundwood products.

Diameter at breast height (d.b.h.).—The outside bark diameter at 4.5 feet above the forest floor on the uphill side of the tree. For determining breast height, the forest floor includes the duff layer that may be present, but does not include unincorporated woody debris that may rise above the ground line.

Face cord.—A stack of stove-length wood (most commonly 16 inches wide) that is 4 feet high and 8 feet long, locally referred to as a "rick."

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of

timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide.

Fuelwood consumption.—The fuelwood burned by residential households.

Fuelwood production.—The volume of roundwood harvested to supply residential households.

Growing-stock removals.—The growing-stock volume removed from the timberland inventory by harvesting roundwood products. (Note: Includes sawtimber removals, poletimber removals, and logging residues.)

Growing-stock tree.—A live timberland tree of commercial species that meets specified standards of size, quality, and merchantability. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume of growing-stock trees 5.0 inches d.b.h. and over, from 1 foot above the ground to a minimum 4.0-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Harvest residues.—The total net volume of unused portions of trees cut or killed by logging. (Note: Includes both logging residues and logging slash.)

Limbwood removals.—Net volume of all portions of a tree other than the central stem, (including forks, large limbs, tops, and stumps) harvested for roundwood products.

Logging residue.—The net volume of unused portions of the merchantable central stem of growing-stock trees cut or killed by logging.

Logging slash.—The net volume of unused portions of the unmerchantable (non-growing-stock) sections of trees cut or killed by logging.

Merchantable sections.—Sections of the central stem of growing-stock trees that meet either pulpwood or saw-log specifications.

Net volume.—Gross volume less deductions for rot, sweep, or other defects affecting use for roundwood products.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial roundwood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 39.9-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, improved roads and nonforest strips must be more than 120 feet wide and more than 1 acre to qualify as nonforest land.)

Nonforest land removals.—Net volume of trees on nonforest lands harvested for roundwood products.

Nontimberland.—The same as nonforest land in this report.

Poletimber.—A growing-stock tree at least 5.0 inches d.b.h. but smaller than sawtimber size (9.0 inches d.b.h. for softwoods, 11.0 inches d.b.h. for hardwoods).

Poletimber removals.—Net volume in the merchantable central stem of poletimber trees harvested for roundwood products.

Primary wood-using mills.—Mills receiving roundwood or chips from roundwood for processing into primary products (lumber, plywood, etc.).

Rotten tree.—A tree that does not meet regional merchantability standards because of excessive unsound cull.

Rough tree.—A tree that does not meet regional merchantability standards because of excessive sound cull. Includes noncommercial tree species.

Roundwood.—Logs, bolts, or other round sections cut from trees (including chips from roundwood).

Sapling.—A live tree between 1.0 and 5.0 inches d.b.h.

Sapling removals.—Net volume in saplings harvested for roundwood products.

Saw-log portion.—That portion of the central stem of sawtimber trees between the stump and the saw-log top.

Saw-log top.—The point on the central stem of sawtimber trees above which a saw log cannot be produced. The minimum saw-log top is 7.0 inches d.o.b. for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber removals.—The net volume in the merchantable central stem of sawtimber trees harvested for roundwood products. (Note: Includes the saw-log and upper-stem portions of sawtimber trees.)

Sawtimber tree.—A growing-stock tree containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9.0 inches d.b.h. and hardwoods must be at least 11.0 inches d.b.h.

Secondary wood-using mills.—Mills receiving primary wood products for manufacture into secondary wood products (furniture, cabinets, etc.).

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Tree.—A woody plant usually having one or more perennial stems, a more or less definitely formed crown of foliage, and a height of at least 12 feet at maturity.

Timberland.—Forest land that is producing, or is capable of producing, in excess of 20 cubic feet per acre per year of industrial roundwood products under natural conditions, is not withdrawn from timber utilization by statute or administrative regulation, and is not associated with urban or rural development. In this report, all forest land removals were assumed to be timberland removals.

Upper stem portion.—That portion of the central stem of sawtimber trees between the saw-log top and the minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Wood residues.—Includes woody material (bark, coarse, fine, etc.) generated at primary wood-using mills, woody material (sawdust, scrap, trim, wood flour, etc.) generated at secondary wood-using plants, and waste secondary wood products.

COMMON AND SCIENTIFIC NAMES OF TREE SPECIES MENTIONED

SOFTWOODS

Cedar
- Rocky mountain juniper ..... *Juniperus scopulorum*
- Eastern redcedar ..... *Juniperus virginiana*

Pine
- Austrian pine ..... *Pinus nigra*
- Ponderosa pine ..... *Pinus ponderosa*
- Scotch pine ..... *Pinus sylvestris*

HARDWOODS

Ash
- Green ash ..... *Fraxinus pennsylvanica*

Boxelder ..... *Acer negundo*

Catalpa
- Northern catalpa ..... *Catalpa speciosa*

Cottonwood
- Eastern cottonwood ..... *Populus deltoides*
- Plains cottonwood ..... *Populus deltoides* var. *occidentalis*

Elm
- American elm ..... *Ulmus americana*
- Siberian elm ..... *Ulmus pumila*
- Slippery elm ..... *Ulmus rubra*
- Rock elm ..... *Ulmus thomasii*

Hackberry ..... *Celtis occidentalis*

Hickory
- Bitternut hickory ..... *Carya cordiformis*
- Shagbark hickory ..... *Carya ovata*

Locust
- Black locust ..... *Robinia pseudoacacia*
- Honeylocust ..... *Gleditsia triacanthos*

Maple
- Silver maple ..... *Acer saccharinum*

Mulberry
- White mulberry ..... *Morus alba*
- Red mulberry ..... *Morus rubra*

Oak

Red oak
- Northern red oak ..... *Quercus rubra*

White oak
- White oak ..... *Quercus alba*

Bur oak ..... *Quercus macrocarpa*
Chinkapin oak ..... *Quercus muehlenbergii*
Walnut
Black walnut ..... *Juglans nigra*
Noncommercial species
Apple ..... *Malus* spp.
Osage-orange ..... *Maclura pomifera*
Ironwood ..... *Ostrya virginiana*

TABLE TITLES

Table 1.—Household possession and use of wood-burning facilities by Forest Survey Unit, Nebraska, 1994

Table 2.—Residential fuelwood consumption by reason for burning and Forest Survey Unit, Nebraska, 1994

Table 3.—Residential fuelwood consumption by type of wood-burning facility and Forest Survey Unit, Nebraska, 1994

Table 4.—Residential fuelwood consumption by type of wood-burning facility and reason for burning, Nebraska, 1994

Table 5.—Residential fuelwood consumption by reason for burning and year first burned wood, Nebraska, 1994

Table 6.—Residential fuelwood consumption by place of consumption, Nebraska, 1994

Table 7.—Residential fuelwood consumption by type of fuelwood, Nebraska, 1994

Table 8.—Residential fuelwood consumption by species group and Forest Survey Unit, Nebraska, 1994

Table 9.—Residential fuelwood consumption by method of procurement and Forest Survey Unit, Nebraska, 1994

Table 10.—Residential consumption of purchased fuelwood by size of wood, Nebraska, 1994

Table 11.—Residential fuelwood production by source of material and Forest Survey Unit, Nebraska, 1994

Table 12.—Residential fuelwood production from roundwood by species group and source of material, Nebraska, 1994

Table 13.—Residential fuelwood production from roundwood by species group and Forest Survey Unit, Nebraska, 1994

Table 14.—Residential fuelwood production from roundwood by species group and ownership class, Nebraska, 1994

Table 15.—Residential fuelwood production from roundwood by source of material and ownership class, Nebraska, 1994

Table 16.—Distribution of timber removals associated with residential fuelwood production by Forest Survey Unit, Nebraska, 1994

Table 17.—Distribution of timber removals associated with residential fuelwood production by species group, Nebraska, 1994

Table 1. -- Household possession and use of wood-burning facilities by Forest Survey Unit, Nebraska, 1994

(In number of households)

Forest Survey Unit	Households	Households with wood-burning facilities	Households burning wood in 1994	Households planning to burn wood in 1995	Households planning to install wood-burning facilities
Eastern	525,014	167,213	108,745	123,108	7,430
Western	77,349	26,210	17,156	18,109	2,859
Total	602,363	193,424	125,901	141,216	10,289

Table 2. -- Residential fuelwood consumption by reason for burning and Forest Survey Unit, Nebraska, 1994

Forest Survey Unit and reason for burning	Number of households	Volume (cords)	Average (Cords/ household)
Eastern			
Pleasure	52,012	29,923	0.58
Primary heat	18,846	56,540	3.00
Secondary heat	37,887	37,557	0.99
Total	108,745	124,020	1.14
Western			
Pleasure	4,289	1,840	0.43
Primary heat	4,766	12,634	2.65
Secondary heat	8,101	12,117	1.50
Total	17,156	26,591	1.55
All Units			
Pleasure	56,301	31,762	0.56
Primary heat	23,612	69,174	2.93
Secondary heat	45,988	49,675	1.08
Total	125,901	150,611	1.20

Table 3. -- Residential fuelwood consumption by type of wood-burning facility and Forest Survey Unit, Nebraska, 1994

Forest Survey Unit and type of wood-burning facility	Number of households	Volume (cords)	Average (Cords/ household)
Eastern			
Stove	22,766	47,979	2.11
Furnace	3,618	11,322	3.13
Fireplace insert	8,752	6,713	0.77
Fireplace	65,421	48,453	0.74
Fire pit[1]	5,805	4,418	0.76
Combinations	2,383	5,135	2.16
Total	108,745	124,020	1.14
Western			
Stove	7,625	14,127	1.85
Furnace	477	1,906	4.00
Fireplace insert	2,859	5,874	2.05
Fireplace	3,812	3,508	0.92
Fire pit[1]	477	183	0.39
Combinations	1,906	992	0.52
Total	17,156	26,591	1.55
All Units			
Stove	30,391	62,106	2.04
Furnace	4,094	13,228	3.23
Fireplace insert	11,611	12,587	1.08
Fireplace	69,234	51,961	0.75
Fire pit[1]	6,282	4,602	0.73
Combinations	4,289	6,127	1.43
Total	125,901	150,611	1.20

[1] Includes small volumes for livestock water heaters and meat smokers.

Table 4. -- Residential fuelwood consumption by type of wood-burning facility and reason for burning, Nebraska, 1994

	All reasons		Reason for burning					
			Primary heat		Secondary heat		Pleasure	
Type of facility	Number of households	Volume (cords)	Number of households	Volume (cords)	Number of households	Volume (cords)	Number of households	(cords)
Stove	30,391	62,106	14,665	42,748	12,390	16,982	3,336	2,377
Furnace	4,094	13,228	1,711	7,322	2,383	5,906	-	-
Fireplace insert	11,611	12,587	2,664	6,572	7,235	4,304	1,711	1,711
Fireplace	69,234	51,961	2,664	7,643	21,597	18,835	44,972	25,484
Fire pit[1]	6,282	4,602	953	2,449	-	-	5,329	2,152
Combinations	4,289	6,127	953	2,440	2,383	3,648	953	39
Total	125,901	150,611	23,612	69,174	45,988	49,675	56,301	31,762

[1] Includes small volumes for livestock water heaters and meat smokers.

Table 5. -- Residential fuelwood consumption by reason for burning and year first burned wood, Nebraska, 1994

Reason for burning and year first burned wood	Number of households	Volume (cords)	Average (Cords/ household)
Pleasure			
Last year	16,832	7,461	0.44
2 years ago	7,604	4,138	0.54
3 years ago	3,423	3,265	0.95
4 years ago	1,711	801	0.47
5 or more years ago	26,731	16,098	0.60
Total	56,301	31,762	0.56
Primary heat			
Last year	2,859	6,205	2.17
2 years ago	953	4,880	5.12
4 years ago	1,906	7,291	3.83
5 or more years ago	17,893	50,798	2.84
Total	23,612	69,174	2.93
Secondary heat			
Last year	7,235	7,587	1.05
2 years ago	4,094	3,788	0.93
3 years ago	5,047	3,707	0.73
4 years ago	3,141	2,869	0.91
5 or more years ago	26,471	31,724	1.20
Total	45,988	49,675	1.08
All reasons			
Last year	26,926	21,253	0.79
2 years ago	12,651	12,805	1.01
3 years ago	8,470	6,972	0.82
4 years ago	6,759	10,961	1.62
5 or more years ago	71,095	98,620	1.39
Total	125,901	150,611	1.20

Table 6. -- Residential fuelwood consumption by place of consumption, Nebraska, 1994

Forest Survey Unit and place of consumption	Number of households	Volume consumed: Primary residence (Cords)	Secondary residence (Cords)	Other building (Cords)	Other[1] (Cords)	Total consumption (Cords)	Average (Cords/ household)
Eastern							
Primary residence	101,034	116,268	-	-	-	116,268	1.15
Other building	1,430	-	-	951	-	951	0.67
Other[1]	5,805	-	-	-	4,418	4,418	0.76
Combination	477	1,191	1,191	-	-	2,383	5.00
Total	108,745	117,459	1,191	951	4,418	124,020	1.14
Western							
Primary residence	15,250	24,789	-	-	-	24,789	1.63
Other building	1,430	-	-	1,618	-	1,618	1.13
Other[1]	477	-	-	-	183	183	0.39
Total	17,156	24,789	-	1,618	183	26,591	1.55
All Units							
Primary residence	116,283	141,057	-	-	-	141,057	1.21
Other building	2,859	-	-	2,569	-	2,569	0.90
Other[1]	6,282	-	-	-	4,602	4,602	0.73
Combination	477	1,191	1,191	-	-	2,383	5.00
Total	125,901	142,249	1,191	2,569	4,602	150,611	1.20

[1] Consumed at campsites, livestock water heaters, or meat smokers.

Table 7. -- Residential fuelwood consumption by type of fuelwood, Nebraska, 1994

Forest Survey Unit and type of fuelwood	Number of households	Volume consumed			Average (Cords/ household)
		Roundwood (Cords)	Wood residues (Cords)	Total consumption (Cords)	
Eastern					
Roundwood	104,369	111,253	-	111,253	1.07
Wood residues	953	-	679	679	0.71
Combination	3,423	7,738	4,350	12,088	3.53
Total	108,745	118,991	5,029	124,020	1.14
Western					
Roundwood	16,203	25,564	-	25,564	1.58
Wood residues	477	-	550	550	1.16
Combination	477	381	95	477	1.00
Total	17,156	25,945	646	26,591	1.55
All Units					
Roundwood	120,572	136,817	-	136,817	1.13
Wood residues	1,430	-	1,230	1,230	0.86
Combination	3,899	8,119	4,445	12,564	3.22
Total	125,901	144,936	5,675	150,611	1.20

Table 8. -- Residential fuelwood consumption by species group and Forest Survey Unit, Nebraska, 1994

(In cords)

Species group	All Units	Forest Survey Unit	
		Eastern	Western
Softwoods			
Cedar	3,234	2,683	550
Pine	2,064	1,826	238
Total softwoods	5,298	4,509	789
Hardwoods			
Boxelder	1,917	1,917	-
Hickory	1,703	1,703	-
Catalpa	682	682	-
Hackberry	1,228	1,065	164
Ash	35,683	32,163	3,520
Locust	1,207	263	944
Walnut	1,801	1,801	-
Osage-orange	2,966	1,277	1,689
Apple	4,393	4,393	-
Mulberry	2,305	2,305	-
Ironwood	392	392	-
Cottonwood	39,701	31,234	8,467
Oak	18,108	18,043	65
Elm	33,226	22,272	10,954
Total hardwoods	145,313	119,511	25,802
All species	150,611	124,020	26,591

Table 9. -- Residential fuelwood consumption by method of procurement and Forest Survey Unit, Nebraska, 1994

Forest Survey Unit and procurement method	Number of households	Volume purchased (Cords)	Volume cut (Cords)	Volume other[1] (Cords)	Total consumption (Cords)	Average (Cords/ household)
Eastern						
Buy[1]	38,906	23,952	-	5,198	29,150	0.75
Cut	55,867	-	70,501	-	70,501	1.26
Cut and Buy[1]	13,973	2,929	15,199	6,241	24,369	1.74
Total	108,745	26,881	85,700	11,439	124,020	1.14
Western						
Buy[1]	3,812	3,703	-	1,196	4,899	1.29
Cut	12,390	-	20,928	-	20,928	1.69
Cut and Buy[1]	953	143	525	95	763	0.80
Total	17,156	3,846	21,453	1,292	26,591	1.55
All Units						
Buy[1]	42,718	27,655	-	6,394	34,049	0.80
Cut	68,257	-	91,429	-	91,429	1.34
Cut and Buy[1]	14,926	3,072	15,724	6,336	25,132	1.68
Total	125,901	30,727	107,153	12,730	150,611	1.20

[1] Includes gift wood, free wood, leftover wood, etc.

Table 10. -- Residential consumption of purchased fuelwood by size of wood, Nebraska, 1994

Size of wood purchased	Number of households	Volume (cords)	Average (Cords/ household)
16 inch	20,255	17,654	0.87
24 inch	13,409	7,000	0.52
4 foot	477	953	2.00
8 foot	1,906	1,121	0.59
Random length roundwood	6,087	4,000	0.66
Total purchased	42,134	30,727	0.73

Table 11. -- Residential fuelwood production by source of material and Forest Survey Unit, Nebraska, 1994

(In cords)

		Source of material					
					Forest land		
Forest Survey Unit	All sources	Cities and villages	Windbreaks, fencerows, rural yards	Pasture and cropland	Standing live trees	Harvest residues	Dead trees
Eastern	141,665	33,021	30,364	36,106	4,144	1,235	36,796
Western	32,171	1,772	10,071	4,829	715	-	14,785
Total	173,837	34,793	40,435	40,935	4,859	1,235	51,581

Table 12. -- Residential fuelwood production from roundwood by species group and source of material, Nebraska, 1994

(In cords)

Species group	All sources	Source of material					
					Forest land		
		Cities and villages	Windbreaks, fencerows, rural yards	Pasture and cropland	Standing live trees	Harvest residues	Dead trees
Softwoods							
Cedar	4,375	3,276	-	269	-	-	831
Pine	2,070	524	522	877	29	-	117
Total softwoods	6,445	3,800	522	1,145	29	-	949
Hardwoods							
Maple	460	458	3	-	-	-	-
Boxelder	3,487	551	1,334	-	-	-	1,602
Hickory	2,311	1,937	374	-	-	-	-
Hackberry	148	-	-	110	14	-	25
Ash	34,678	387	6,637	13,629	873	-	13,152
Locust	635	-	635	-	-	-	-
Walnut	1,665	-	174	1,481	3	-	6
Osage-orange	3,744	-	3,744	-	-	-	-
Apple	3,512	3,512	-	-	-	-	-
Mulberry	731	-	209	522	-	-	-
Ironwood	422	-	-	-	-	-	422
Cottonwood	38,981	387	9,791	14,223	1,776	-	12,804
Oak	21,294	8,438	2,004	5,100	719	892	4,141
Elm	55,324	15,325	15,008	4,724	1,444	343	18,481
Total hardwoods	167,392	30,993	39,913	39,790	4,829	1,235	50,632
All species	173,837	34,793	40,435	40,935	4,859	1,235	51,581

Table 13. -- Residential fuelwood production from roundwood by species group and Forest Survey Unit, Nebraska, 1994

(In cords)

Species group	All Units	Forest Survey Unit	
		Eastern	Western
Softwoods			
Cedar	4,375	4,232	143
Pine	2,070	1,831	238
Total softwoods	6,445	6,064	381
Hardwoods			
Maple	460	460	-
Boxelder	3,487	3,487	-
Hickory	2,311	2,311	-
Hackberry	148	38	110
Ash	34,678	29,361	5,317
Locust	635	635	-
Walnut	1,665	1,665	-
Osage-orange	3,744	3,493	251
Apple	3,512	2,833	679
Mulberry	731	731	-
Ironwood	422	422	-
Cottonwood	38,981	31,605	7,376
Oak	21,294	21,215	79
Elm	55,324	37,346	17,978
Total hardwoods	167,392	135,602	31,790
All species	173,837	141,665	32,171

Table 14. -- Residential fuelwood production from roundwood by species group and ownership class, Nebraska, 1994

(In cords)

Species group	All ownerships	State	County/ municipal	Other private
Softwoods				
Cedar	4,375	-	2,288	2,088
Pine	2,070	-	228	1,842
Total softwoods	6,445	-	2,516	3,929
Hardwoods				
Maple	460	-	89	371
Boxelder	3,487	-	107	3,380
Hickory	2,311	-	1,140	1,171
Hackberry	148	-	-	148
Ash	34,678	-	76	34,602
Locust	635	-	-	635
Walnut	1,665	-	-	1,665
Osage-orange	3,744	183	-	3,561
Apple	3,512	-	407	3,105
Mulberry	731	-	-	731
Ironwood	422	-	-	422
Cottonwood	38,981	-	76	38,905
Oak	21,294	-	4,690	16,604
Elm	55,324	-	2,843	52,481
Total hardwoods	167,392	183	9,427	157,781
All species	173,837	183	11,943	161,711

Table 15. -- Residential fuelwood production from roundwood by source of material and ownership class, Nebraska, 1994

(In cords)

Ownership class	All sources	Source of material					
		Cities and villages	Windbreaks, fencerows, rural yards	Pasture and cropland	Forest land		
					Standing live trees	Harvest residues	Dead trees
State	183	-	183	-	-	-	-
County/municipal	11,943	11,881	-	-	-	62	-
Other private	161,711	22,912	40,252	40,935	4,859	1,173	51,581
Total	173,837	34,793	40,435	40,935	4,859	1,235	51,581

Table 16. -- Distribution of timber removals associated with residential fuelwood production by Forest Survey Unit, Nebraska, 1994

(In thousand cubic feet)

Forest Survey Unit	Timberland removals								Total timberland removals	Non-timberland removals	Total Removals
	Growing-stock removals			Non-growing-stock removals							
	Sawtimber	Poletimber	Total	Limbwood	Sapling	Cull trees	Dead trees	Total			
Eastern	88	65	153	106	32	84	2,578	2,799	2,952	6,964	9,917
Western	12	10	22	9	5	14	1,035	1,063	1,085	1,167	2,252
Total	100	75	175	115	37	98	3,613	3,862	4,037	8,131	12,169

Table 17. -- Distribution of timber removals associated with residential fuelwood production by species group, Nebraska, 1994

(In thousand cubic feet)

Species group	Timberland removals										
	Growing-stock removals			Non-growing-stock removals					Total timberland removals	Non-timberland removals	Total Removals
	Sawtimber	Poletimber	Total	Limbwood	Sapling	Cull trees	Dead trees	Total			
Softwoods											
Cedar	-	-	-	-	-	-	58	58	58	248	306
Pine	1	-	1	-	-	1	8	9	10	135	145
Total softwoods	1	-	1	-	-	1	66	68	68	383	451
Hardwoods											
Maple	-	-	-	-	-	-	-	-	-	32	32
Boxelder	-	-	-	-	-	-	112	112	112	132	244
Hickory	-	-	-	-	-	-	-	-	-	162	162
Hackberry	*	*	*	*	*	*	2	2	3	8	10
Ash	15	12	27	10	7	17	921	955	982	1,446	2,427
Locust	-	-	-	-	-	-	-	-	-	44	44
Walnut	-	-	-	*	-	*	-	1	1	116	117
Osage-orange	-	-	-	-	-	-	-	-	-	262	262
Apple	-	-	-	-	-	-	-	-	-	246	246
Mulberry	-	-	-	-	-	-	-	-	-	51	51
Ironwood	-	-	-	-	-	-	30	30	30	-	30
Cottonwood	31	25	55	21	13	34	896	965	1,021	1,708	2,729
Oak	24	15	40	49	6	16	291	363	403	1,088	1,491
Elm	29	22	52	33	11	29	1,294	1,367	1,419	2,454	3,873
Total hardwoods	100	75	174	114	37	97	3,546	3,794	3,969	7,749	11,717
All species	100	75	175	115	37	98	3,613	3,862	4,037	8,131	12,169

* Less than 500 cubic feet.

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Reports findings of the latest survey of residential fuelwood consumption and production in Nebraska. Topics examined include the geographic distribution of residential fuelwood consumption and production within the State; the species of trees used for residential fuelwood; the types of wood-burning facilities used; the reasons for burning fuelwood; and the land, ownership, and tree classes from which fuelwood was produced.

KEY WORDS: Fireplace, firewood, harvest, households, roundwood, wood stove.

Our job at the North Central Forest Experiment Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.

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